

SECTION 2-12 CONSTRUCTION GEOTEXTILE (INSTALLATION REQUIREMENTS)
May 28, 1996

DIVISION 2 is revised by adding the following new section:

2-12 CONSTRUCTION GEOTEXTILE (INSTALLATION REQUIREMENTS)

2-12.1 Description

The Contractor shall furnish and place construction geotextile in accordance with the details shown in the Plans.

2-12.2 Materials

Materials shall meet the requirements of the following section:

Construction Geotextile

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Geotextile roll identification, storage, and handling shall be in conformance to ASTM D 4873. During periods of shipment and storage, the geotextile shall be stored off the ground. The geotextile shall be covered at all times during shipment and storage such that it is fully protected from ultraviolet radiation including sunlight, site construction damage, precipitation, chemicals that are strong acids or strong bases, flames including welding sparks, temperatures in excess of 160 F, and any other environmental condition that may damage the physical property values of the geotextile.

Unless specified otherwise in the Plans, the geotextile required for underground drainage shall be "Moderate Survivability" and "Drainage Class C", and permanent erosion control applications shall be "High Survivability" and "Drainage Class C".

2-12.3 Construction Requirements

The area to be covered by the geotextile shall be graded to a smooth, uniform condition free from ruts, potholes, and protruding objects such as rocks or sticks. The geotextile shall be spread immediately ahead of the covering operation. The geotextile shall not be left exposed to sunlight during installation for a total of more than 14 calendar days. The geotextile shall be laid smooth without excessive wrinkles. Under no circumstances shall the geotextile be dragged through mud or over sharp objects which could damage the geotextile. The cover material shall be placed on the geotextile such that the minimum initial lift thickness required will be between the equipment tires or tracks and the geotextile at all times. Construction vehicles shall be limited in size and weight, to reduce rutting in the initial lift above the geotextile, to not greater than 3 inches deep to prevent overstressing the geotextile. Turning of vehicles on the first lift above the geotextile will not be permitted.

Soil piles or the manufacturer's recommended method, shall be used as needed to hold the geotextile in place until the specified cover material is placed.

Should the geotextile be torn, punctured, or overlaps or sewn joints disturbed, as evidenced by visible geotextile damage, subgrade pumping, intrusion, or roadbed distortion, the backfill around the damaged or displaced area shall be removed and the damaged area repaired or replaced by the Contractor at no expense to the Contracting Agency. The repair shall consist of a patch of the same type of geotextile placed over the damaged area. The patch shall overlap the existing geotextile from the edge of any part of the damaged area by the minimum required overlap for the application.

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2 If geotextile seams are to be sewn in the field or at the factory, the seams shall
3 consist of one row of stitching unless the geotextile where the seam is to be sewn
4 does not have a selvage edge. If a selvage edge is not present, the seams shall
5 consist of two parallel rows of stitching, or shall consist of a J-seam, Type SSn-1,
6 using a single row of stitching. The two rows of stitching shall be 1.0 inch apart
7 with a tolerance of plus or minus 0.5 inch and shall not cross except for
8 restitching. The stitching shall be a lock-type stitch. The minimum seam
9 allowance, i.e., the minimum distance from the geotextile edge to the stitch line
10 nearest to that edge shall be 1.5 inches if a flat or prayer seam, Type SSa-2, is
11 used. The minimum seam allowance for all other seam types shall be 1.0 inch.
12 The seam, stitch type, and the equipment used to perform the stitching shall be as
13 recommended by the manufacturer of the geotextile and as approved by the
14 Engineer.

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16 The seams shall be sewn in such a manner that the seam can be inspected
17 readily by the Engineer or a representative. The seam strength will be tested and
18 shall meet the requirements stated herein.

19 20 **2-12.3(1) Underground Drainage**

21 Trench walls shall be smooth and stable. The geotextile shall be placed in a
22 manner which will ensure intimate contact between the soil and the geotextile (i.e.
23 no. voids, folds, or wrinkles).

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25 The geotextile shall either be overlapped a minimum of 12 inches at all
26 longitudinal and transverse joints, or the geotextile joints shall be sewn for
27 medium survivability drainage applications. In those cases where the trench
28 width is less than 12 inches, the minimum overlap shall be the trench width.

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30 In moderate survivability geotextile underdrain applications, the minimum overlap
31 shall be 12 inches, or the geotextile joints shall be sewn, except where the
32 geotextile is used in area drains. An area drain is defined as a geotextile layer
33 placed over or under a horizontal to moderately sloping layer of drainage
34 aggregate. For area drains, the geotextile shall be overlapped a minimum of 2 feet
35 at all longitudinal and transverse joints, or the geotextile joints shall be sewn
36 together. The minimum initial lift thickness over the geotextile in the area drain
37 shall be 12 inches.

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39 In all cases, the upstream geotextile sheet shall overlap the next downstream
40 sheet.

41 42 **2-12.3(2) Separation**

43 The geotextile shall either be overlapped a minimum of 2 feet at all longitudinal
44 and transverse joints, or the geotextile joints shall be sewn together. The initial lift
45 thickness shall be 6 inches or more.

46 47 **2-12.3(3) Soil Stabilization**

48 The geotextile shall either be overlapped a minimum, of 2 feet at all longitudinal
49 and transverse joints, or the geotextile shall be sewn together. The initial lift
50 thickness shall be 12 inches or more. Compaction of the first lift above the
51 geotextile shall be by Method A (Section 2-03.3(14)C). No vibratory compaction
52 will be allowed on the first lift.

53 54 **2-12.3(4) Permanent Erosion Control and Ditch Lining**

55 Unless otherwise specified in the Plans, the geotextile shall either be overlapped
56 a minimum of 2 feet at all longitudinal and transverse joints, or the geotextile joints
57 shall be sewn together. If overlapped, the geotextile shall be placed so that the

upstream strip of geotextile will overlap the next downstream strip. When placed on slopes, each strip shall overlap the next downhill strip.

Placement of aggregate and riprap or other cover material on the geotextile shall start at the toe of the slope and proceed upwards. The geotextile shall be keyed at the top and the toe of the slope as shown in the Plans. The geotextile shall be secured to the slope, but shall be secured loosely enough so that the geotextile will not tear when the riprap or other cover material is placed on the geotextile. The geotextile shall not be keyed at the top of the slope until the riprap or other cover material is in place to the top of the slope.

All voids in the riprap or other cover material that allow the geotextile to be visible shall be backfilled with quarry spalls or other small stones, as designated by the Engineer, so that the geotextile is completely covered. When an aggregate cushion between the geotextile and the riprap or other cover material is required, it shall have a minimum thickness of 12 inches.

An aggregate cushion will be required to facilitate drainage when hand placed riprap, sack riprap, or concrete slab riprap, as specified in Sections 9-13.2, 9-13.3, or 9-13.4, respectively, is used with the geotextile.

Grading of slopes after placement of the riprap or other cover material will not be allowed if grading results in stone movement directly on the geotextile. Under no circumstances shall stones weighing more than 100 lbs. be allowed to roll downslope. Stones shall not be dropped from a height greater than 3 feet above the geotextile surface if an aggregate cushion is present, or 1.0 foot if a cushion is not present. Lower drop heights may be required if geotextile damage from the stones is evident, as determined by the Engineer. If the geotextile is placed on slopes steeper than 2:1, the stones shall be placed on the slope without free-fall for moderate survivability, high survivability, and ditch lining geotextiles.

2-12.3(5) Temporary Silt Fences

The Contractor shall install and maintain temporary silt fences at the locations shown in the Plans. The silt fences shall be constructed in the areas of clearing, grading, or drainage prior to starting those activities. A silt fence shall not be considered temporary if the silt fence must function beyond the life of the contract. The silt fence shall prevent soil carried by runoff water from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence. The minimum height of the top of silt fence shall be 2 feet and the maximum height shall be 2.5 feet above the original ground surface. Damaged or otherwise improperly functioning portions of silt fences shall be repaired or replaced by the Contractor at no cost to the Contracting Agency, as determined by the Engineer.

The geotextile shall be attached on the up-slope side of the posts and support system with staples, wire, or in accordance with the manufacturer's recommendations. The geotextile shall be attached to the posts in a manner which reduces the potential for geotextile tearing at the staples, wire, or other connection device. Silt fence back-up support for the geotextile in the form of a wire or plastic mesh is optional, depending on the properties of the geotextile selected for use in Table 6 in Section 9-33.2. If wire or plastic back-up mesh is used, the mesh shall be fastened securely to the up-slope of the posts with the geotextile being up-slope of the mesh back-up support.

The Geotextile shall be sewn together at the point of manufacture, or at an approved location as determined by the Engineer, to form geotextile lengths as required. All sewn seams shall be located at a support post. Alternatively, two sections of silt fence can be overlapped, provided the Contractor can demonstrate, to the satisfaction of the Engineer, that the overlap is long enough

and that the adjacent fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.

The geotextile at the bottom of the fence shall be buried in a trench to a minimum depth of 6 inches below the ground surface. The trench shall be backfilled and the soil tamped in place over the buried portion of the geotextile as shown in the Plans, such that no flow can pass beneath the fence nor scour occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the trench a minimum of 3 inches. The fence posts shall be placed or driven a minimum of 1.5 feet into the ground. A minimum depth of 12 inches will be allowed if topsoil or other soft subgrade soil is not present, and minimum depth of 1.5 feet cannot be reached. Fence post depths shall be increased by 6 inches if the fence is located on slopes of 3:1 or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading, as approved by the Engineer.

Silt fences shall be located on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence as shown in the Plans. If the fence must cross contours, with the exception of the ends of the fence, gravel check dams placed perpendicular to the back of the fence shall be used to minimize concentrated flow and erosion along the back of the fence. The gravel check dams shall be approximately 1 foot deep at the back of the fence and be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence as shown in the Plans. The gravel check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. The gravel check dams shall be located every 10 feet along the fence where the fence must cross contours. The slope of the fence line where contours must be crossed shall not be steeper than 3:1.

Either wood or steel posts shall be used. Wood posts shall have minimum dimensions of 1.5 inches by 1.5 inches by the minimum length shown in the Plans, and shall be free of defects such as knots, splits, or gouges. Steel posts shall consist of either size No. 6 rebar or larger, ASTM A 120 steel pipe with a minimum diameter of 1.0 inch, U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs/ft, or other steel posts having equivalent strength and bending resistance to the post sizes listed. The spacing of the support posts shall be a maximum of 6.6 feet as shown in the Plans.

Fence back-up support, if used, shall consist of steel wire with a maximum mesh spacing of 2 inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than that required in Table 6 for unsupported geotextile (i.e., 180 lbs. grab tensile strength). The polymeric mesh must be as resistant to ultraviolet radiation as the geotextile it supports.

Sediment deposits shall either be removed when the deposit reaches approximately one-third the height of the silt fence, or a second silt fence shall be installed, as determined by the Engineer.

2-12.4 Measurement

Construction geotextile, with the exception of temporary silt fence geotextile and underground drainage geotextile used in trench drains, will be measured by the square yard for the ground surface area actually covered.

Temporary silt fence geotextile will be measured by the linear foot of completed fence, along the ground line.

Underground drainage geotextile used in trench drains will be measured by the square yard for the perimeter of drain actually covered.

2-12.5 Payment

Payment will be made in accordance with Section 1-04.1, for each of the following bid items that are included in the proposal:

1. "Construction Geotextile for Underground Drainage," per square yard.
2. "Construction Geotextile for Separation," per square yard.
3. "Construction Geotextile for Soil Stabilization," per square yard.
4. "Construction Geotextile for Permanent Erosion Control," per square yard.
5. "Construction Geotextile for Ditch Lining," per square yard.
6. "Construction Geotextile for Temporary Silt Fence," per linear foot.

Sediment removal behind silt fences will be paid by force account under temporary water pollution/erosion control. If a new silt fence is installed in lieu of sediment removal, the silt fence will be paid for at the unit contract price per linear foot for "Construction Geotextile for Temporary Silt Fence."